

# El Niño Effects on Major World Crop Growing Areas

C. F. Ropelewski  
IRI for Climate Prediction  
Earth Institute, Columbia University

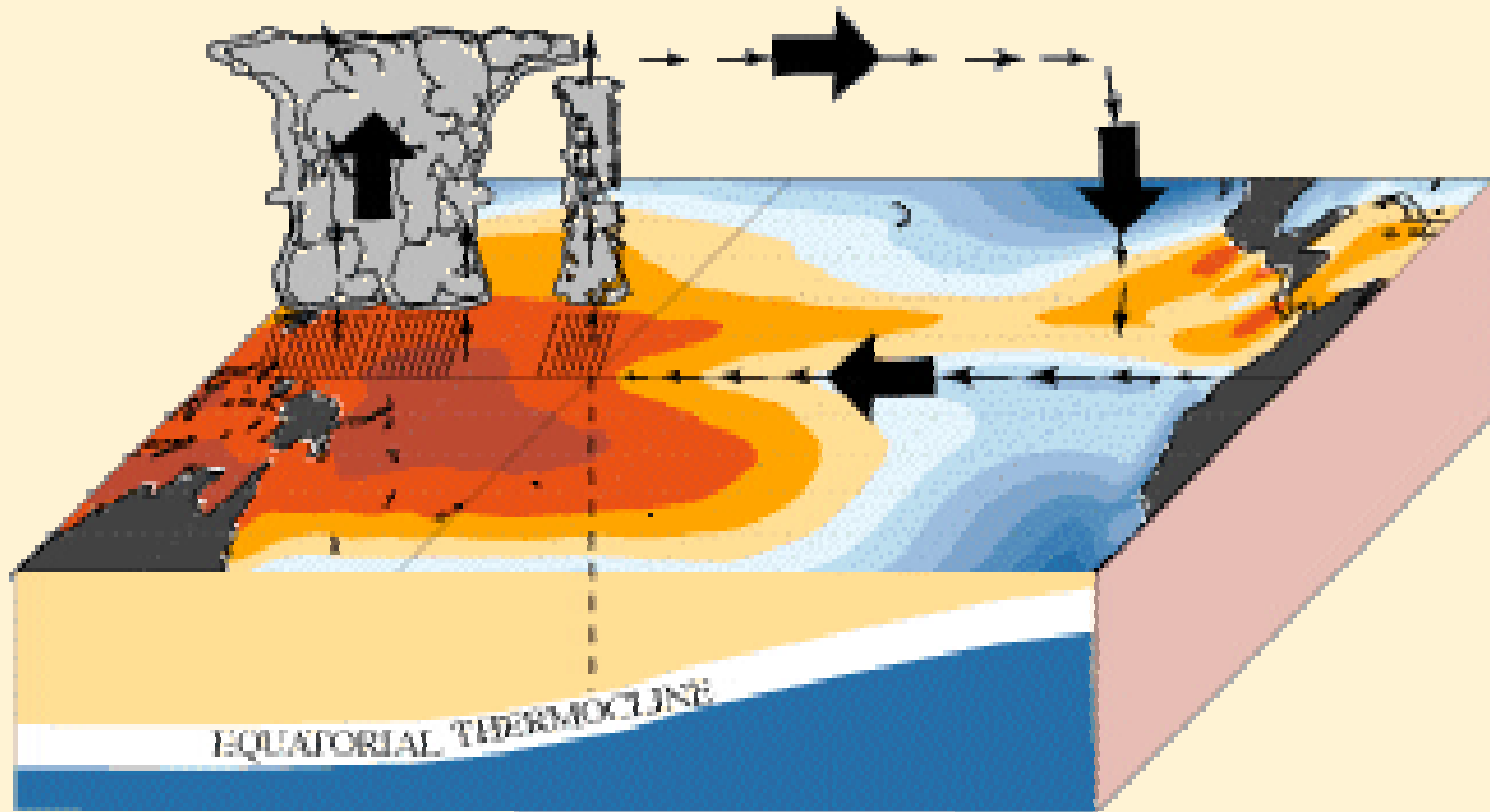
Presented at:  
USDA's Agricultural Outlook Forum 2003  
20-21 February 2003  
Arlington, VA

# OUTLINE

- A brief overview of ENSO  
(El Niño /Southern Oscillation)
- Typical ENSO rainfall patterns
- A review of the 2002-03 global rainfall
- A look at recent seasonal forecasts

# Tropical Pacific – Average State

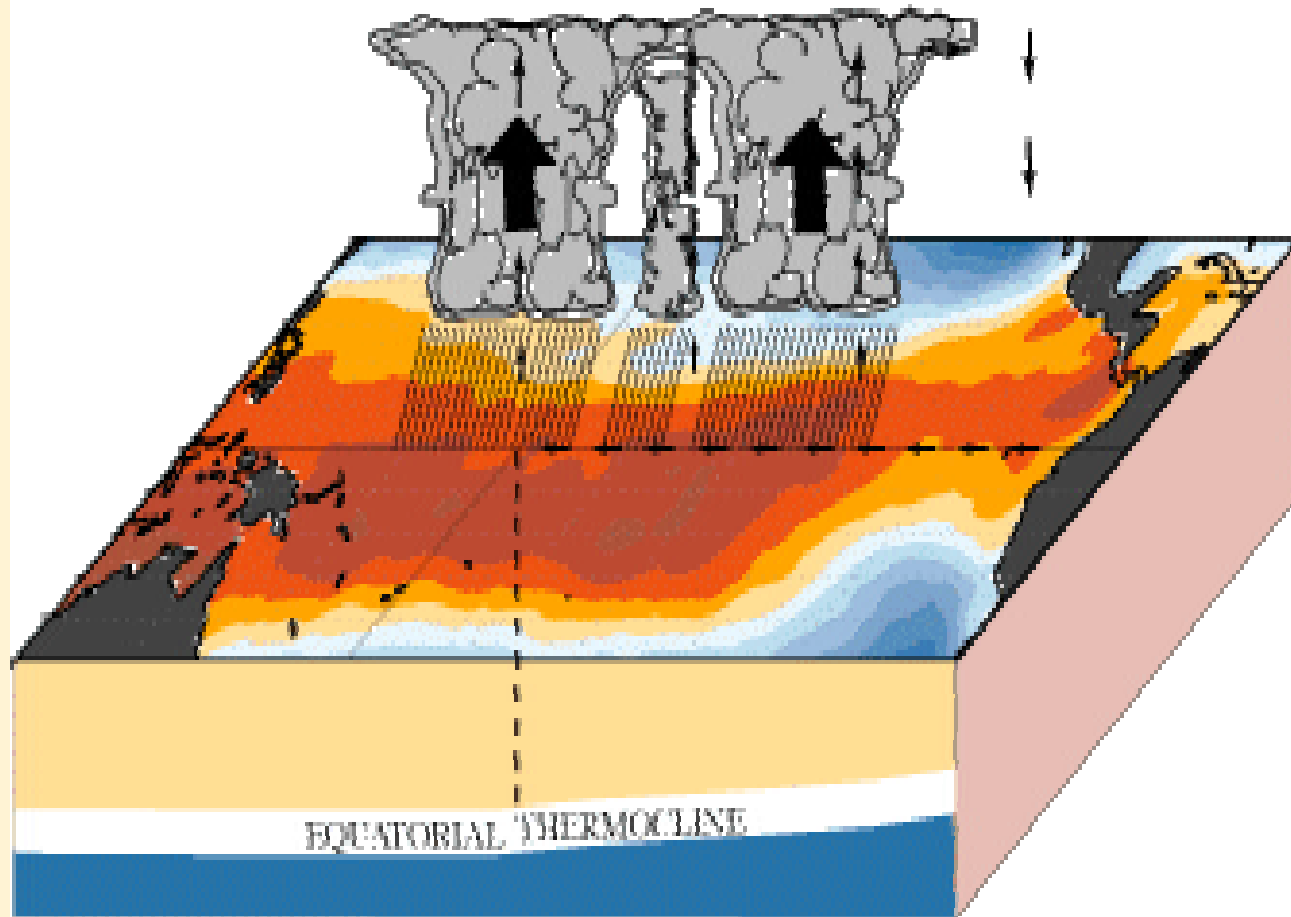
**December - February Normal Conditions**



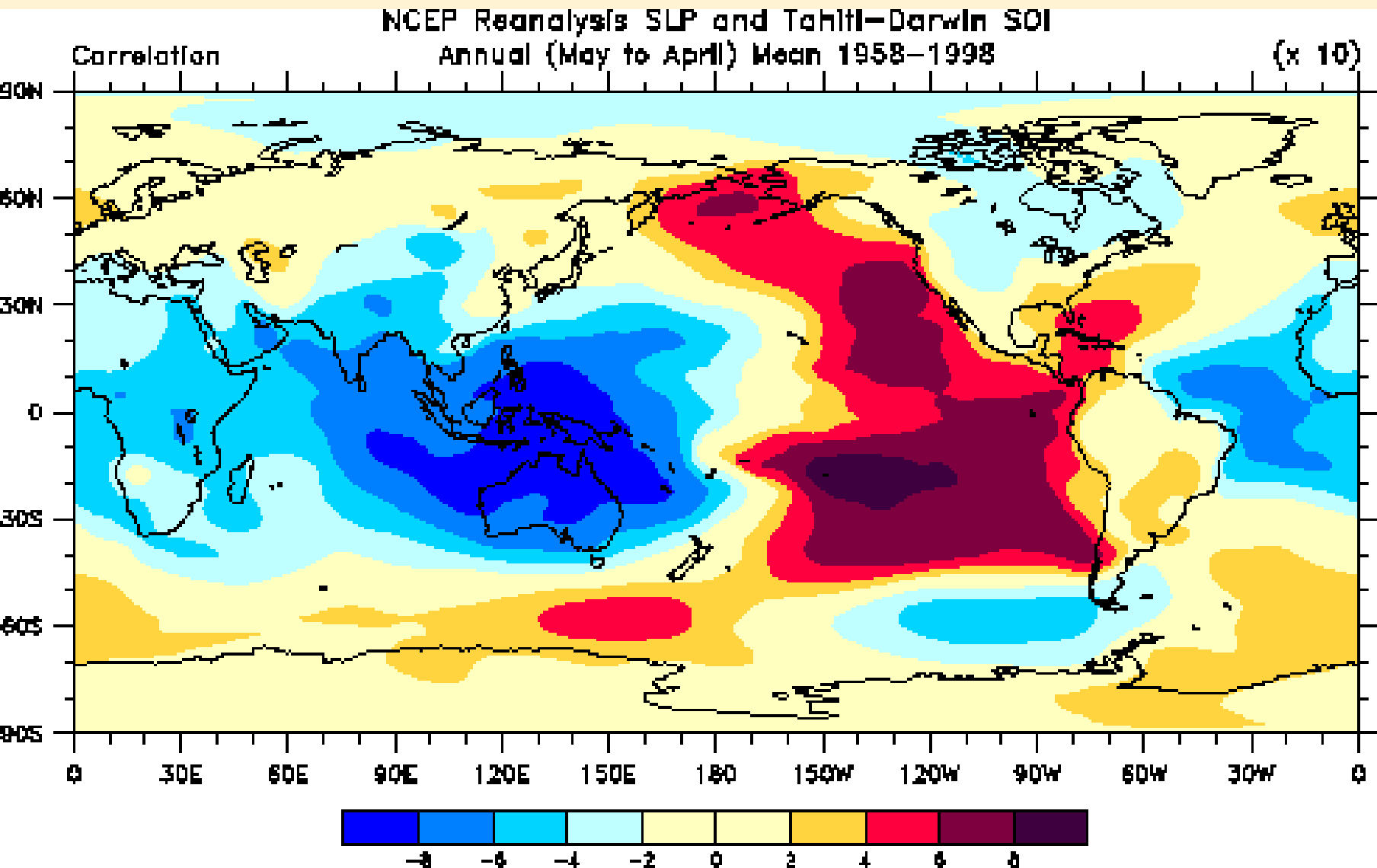
## El Niño

*Trade winds get weaker  
Warm water flows back eastward  
Convection moves eastward  
Winds weaken further, etc.*

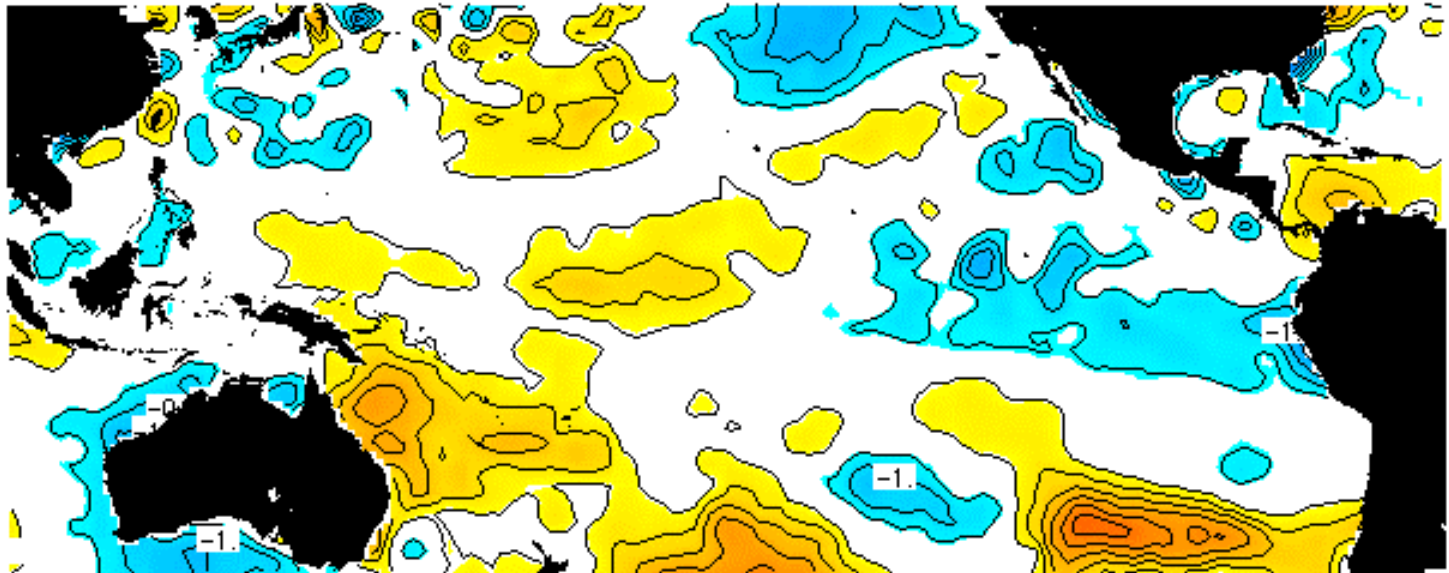
### December - February El Niño Conditions



# The Southern Oscillation



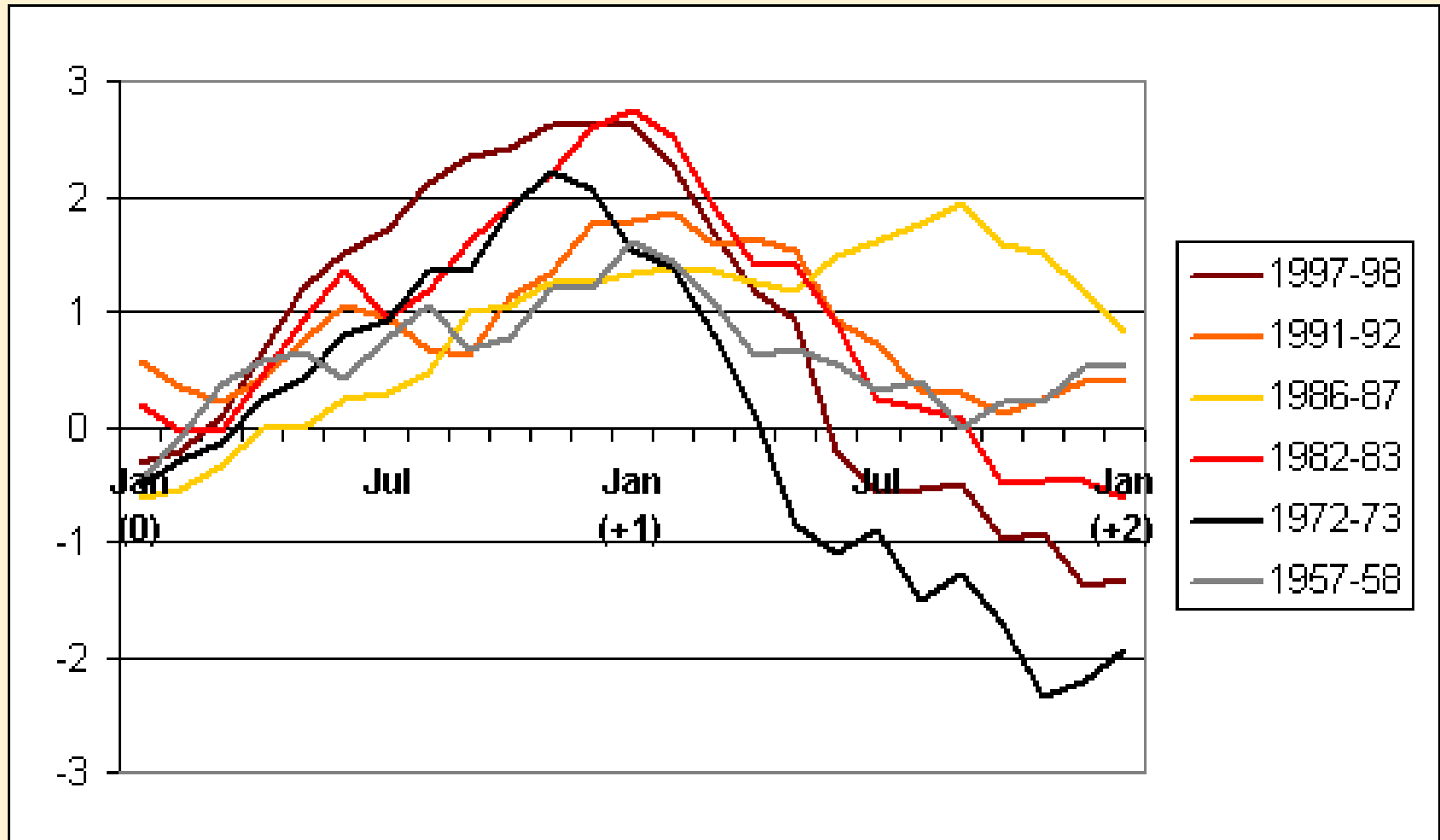
# Animation SST



9 Jan 2002

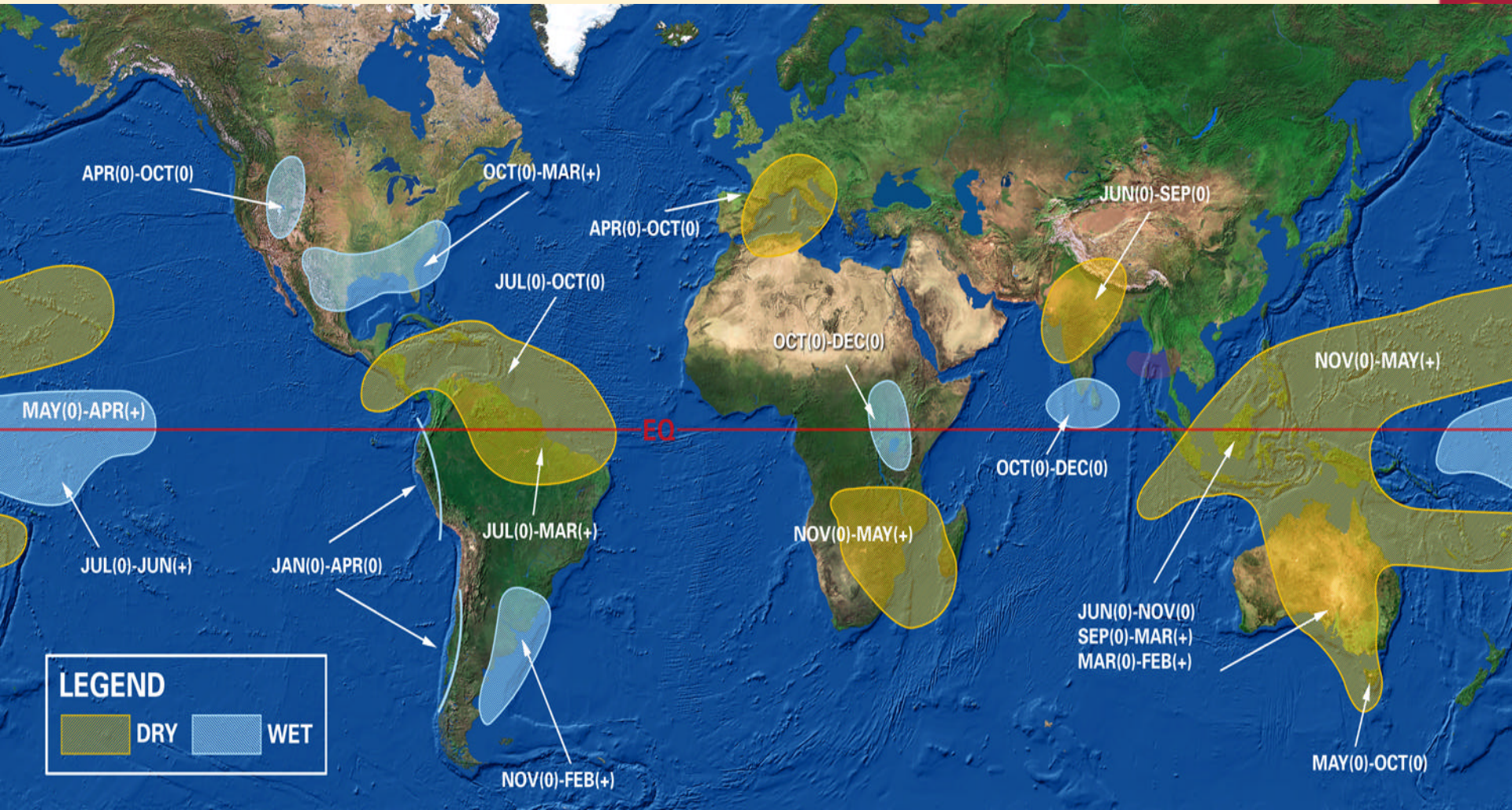
All El Niño  
and  
La Niña  
episodes are unique,  
but they share  
Common features

# El Niño Events tend to peak near end of the year



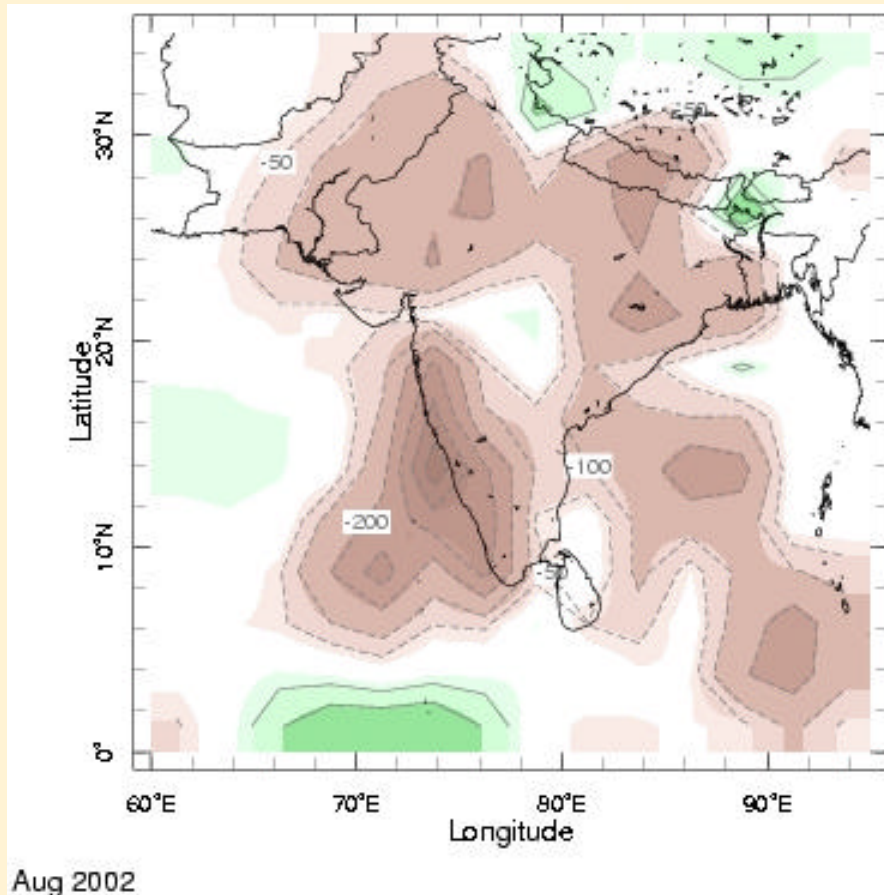


# Typical Rainfall Patterns associated with El Nino Episodes



## 2002 Failed Monsoon

- First failed monsoon since 1987
- Driest July on record
- Drought comparable to 1972

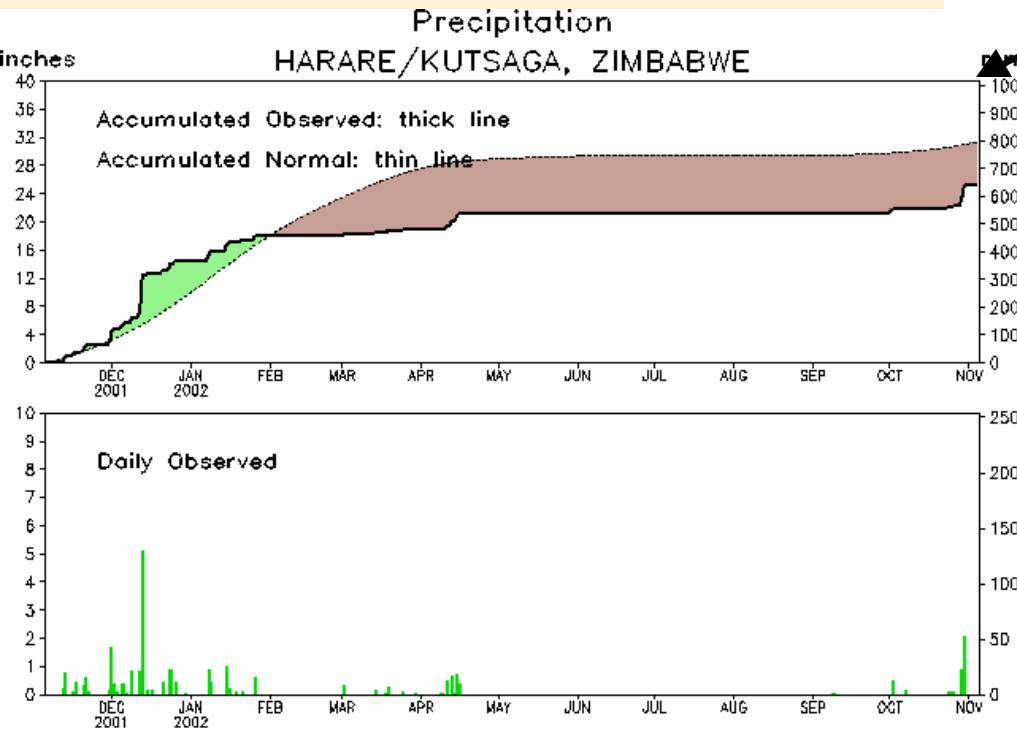
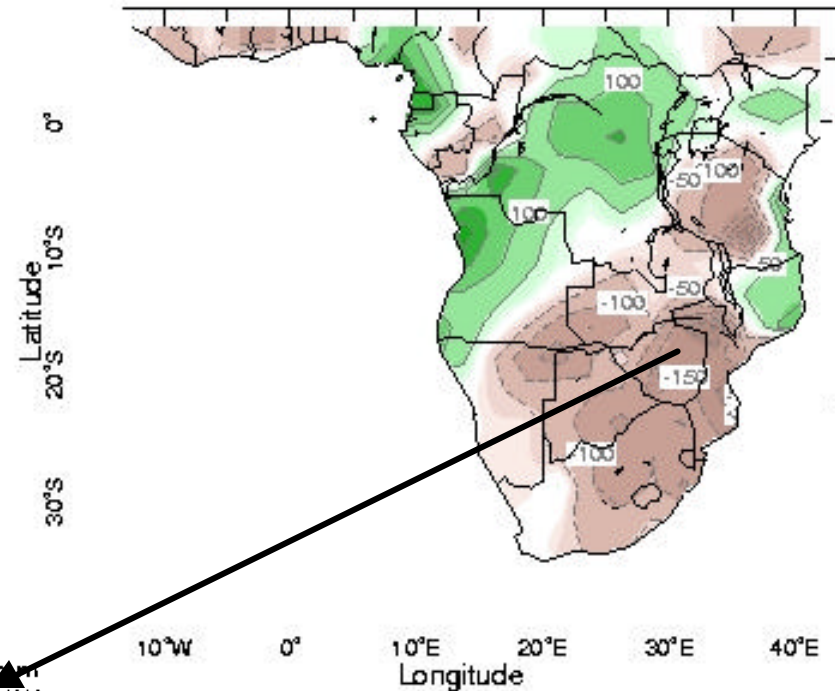




# Southern Africa Drought Jan-Apr 2002

## PRCP Anomaly (mm)

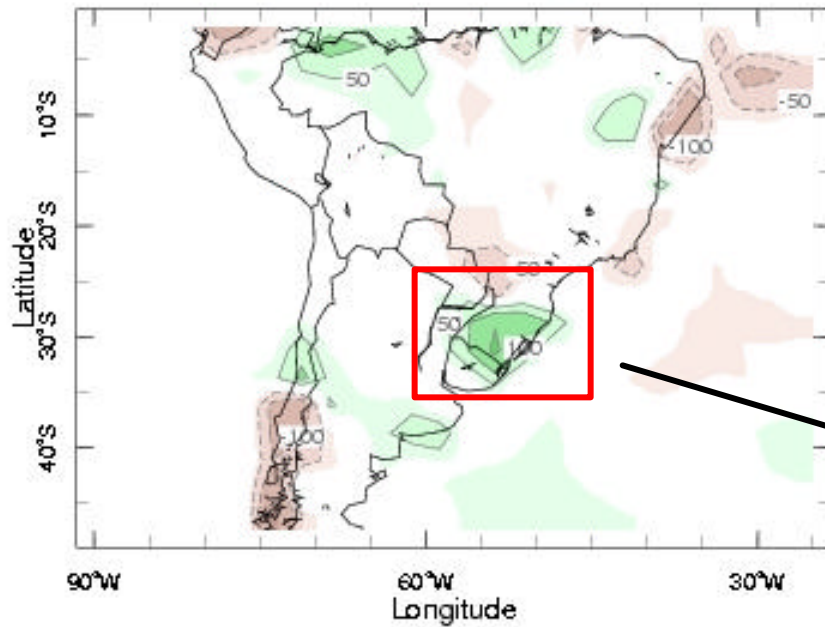
Erratic end of rainy season  
The coming El Nino?



Data updated through 04 NOV 2002

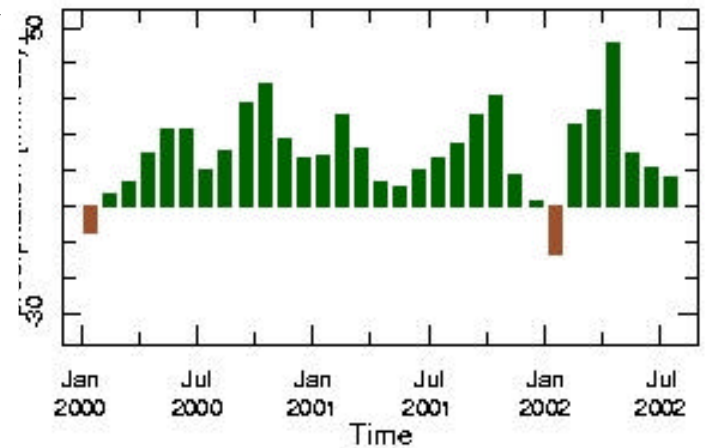
CLIMATE PREDICTION CENTER/NCEP

## Prolonged Wet Spell SE South America



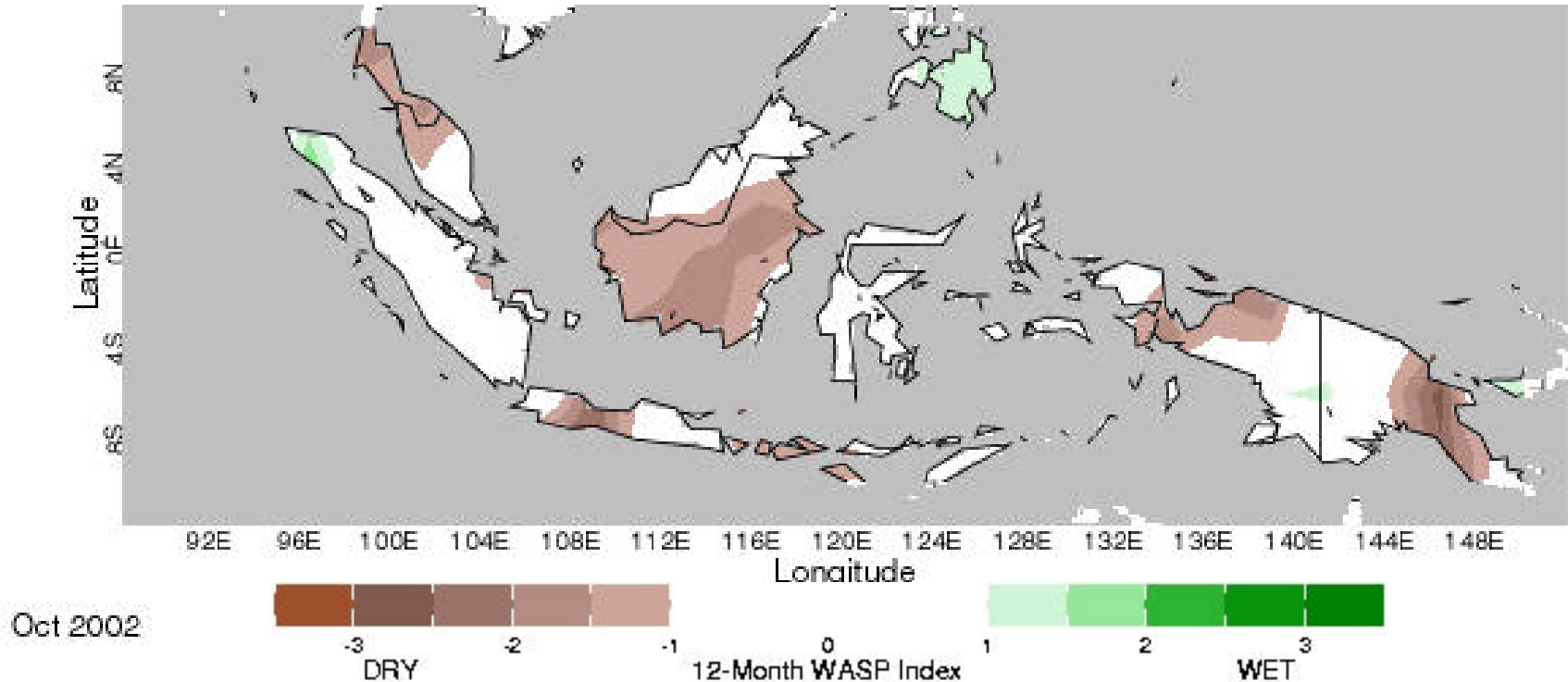
**June – Aug PRCP anomaly (mm)**

3-mo running average PRCP



# Dry Conditions in Indonesia

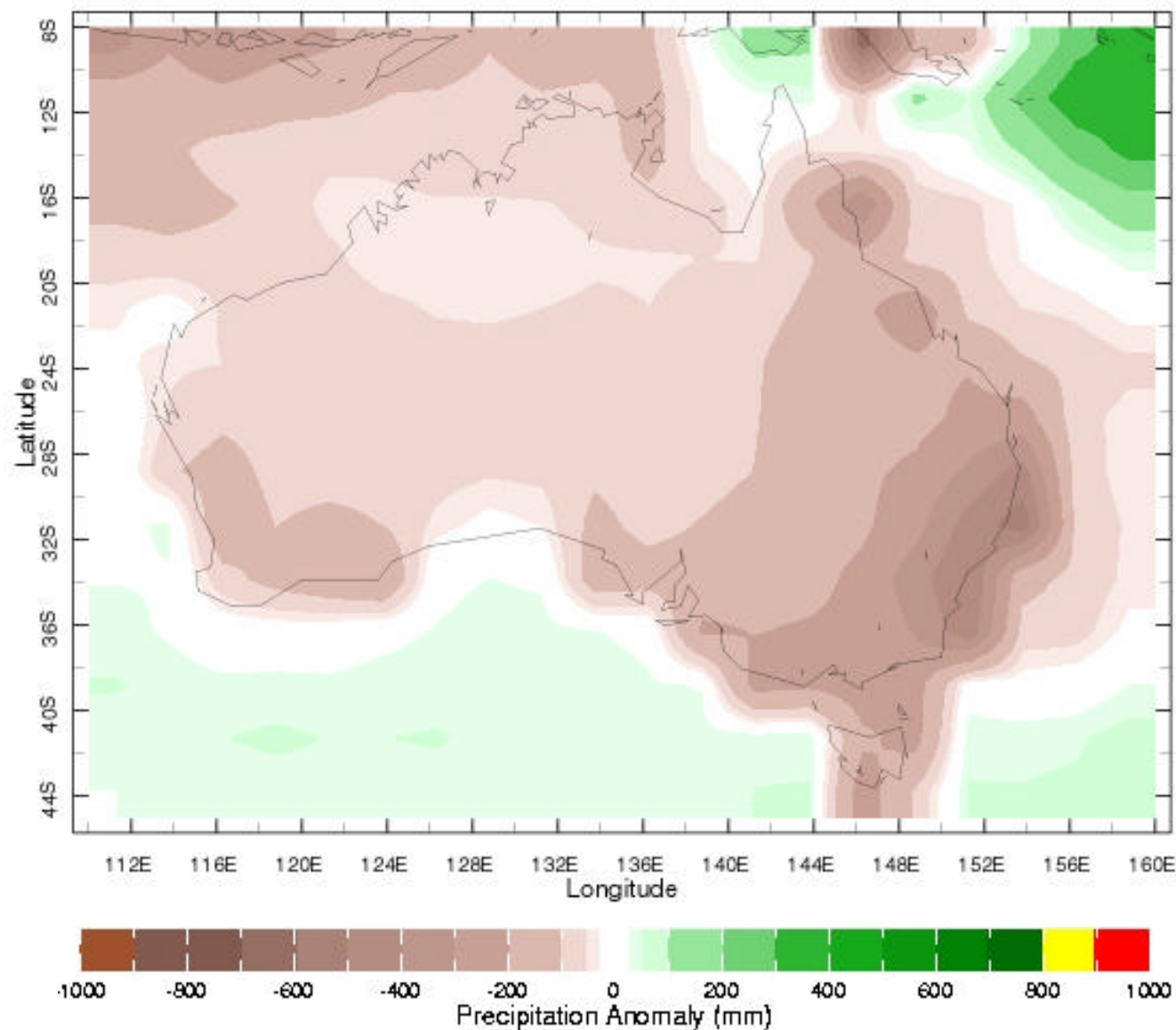
## 12-Month WASP Index, October 2002



WASP is an acronym for the *Weighted Anomaly Standardized Precipitation* index, which is based on monthly rainfall departures from the long-term (30-year) average.

- Very dry anomalies primarily in parts of Borneo and Java
- Deficits in the past year as large as 1000 mm

## April-October 2002 Accumulated Precipitation Anomaly (mm, CAMS-OPI)

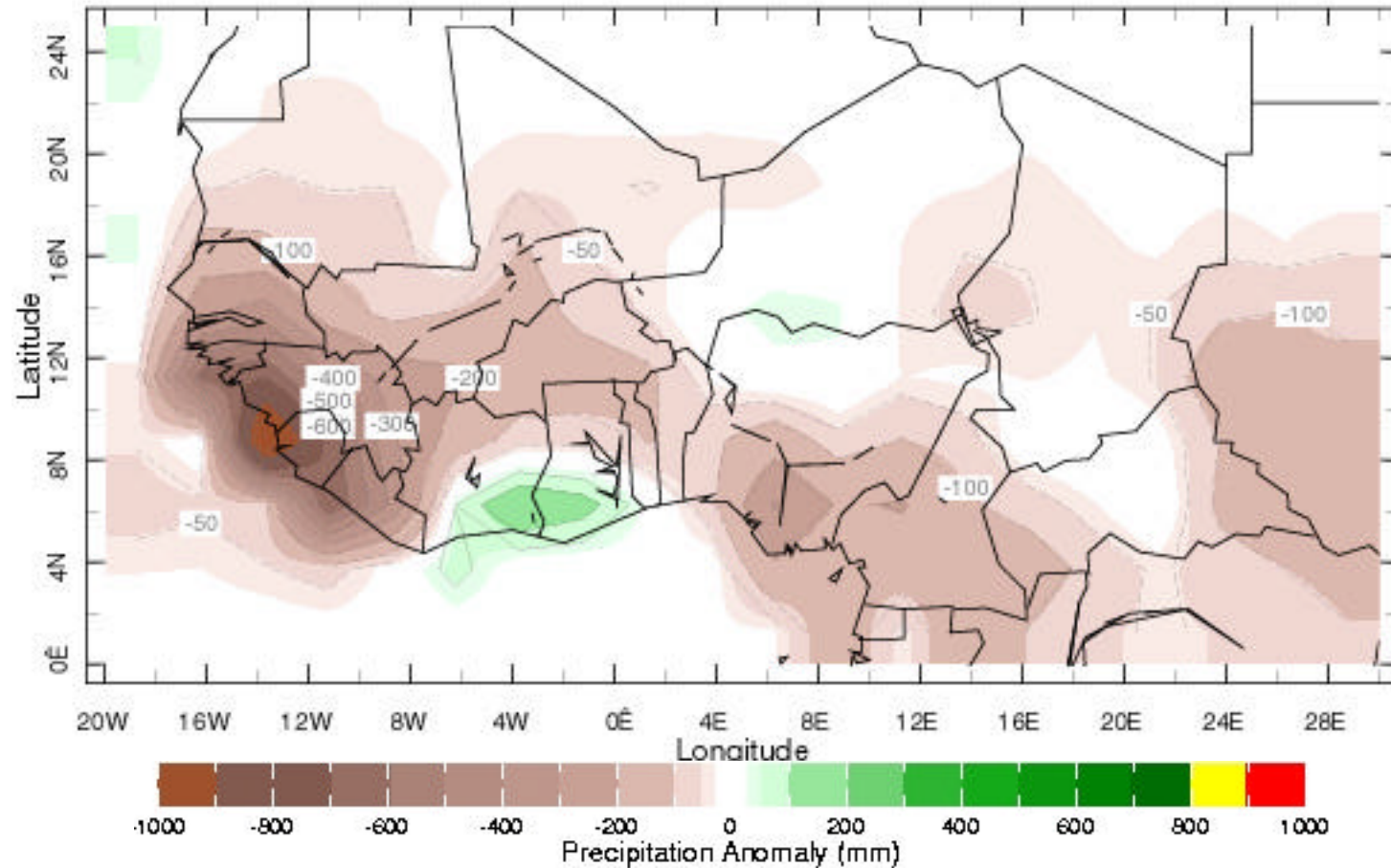


## Australian Drought

Nearly 70% of Australia experienced April-October 2002 rainfall in the lowest 5% to 10% of the historical record for the period. In terms of extent and mean percentile, it was the **driest 7-month period** observed for the country as a whole. The areas most seriously affected are in the southern half of the country.  
(Australian BOM)

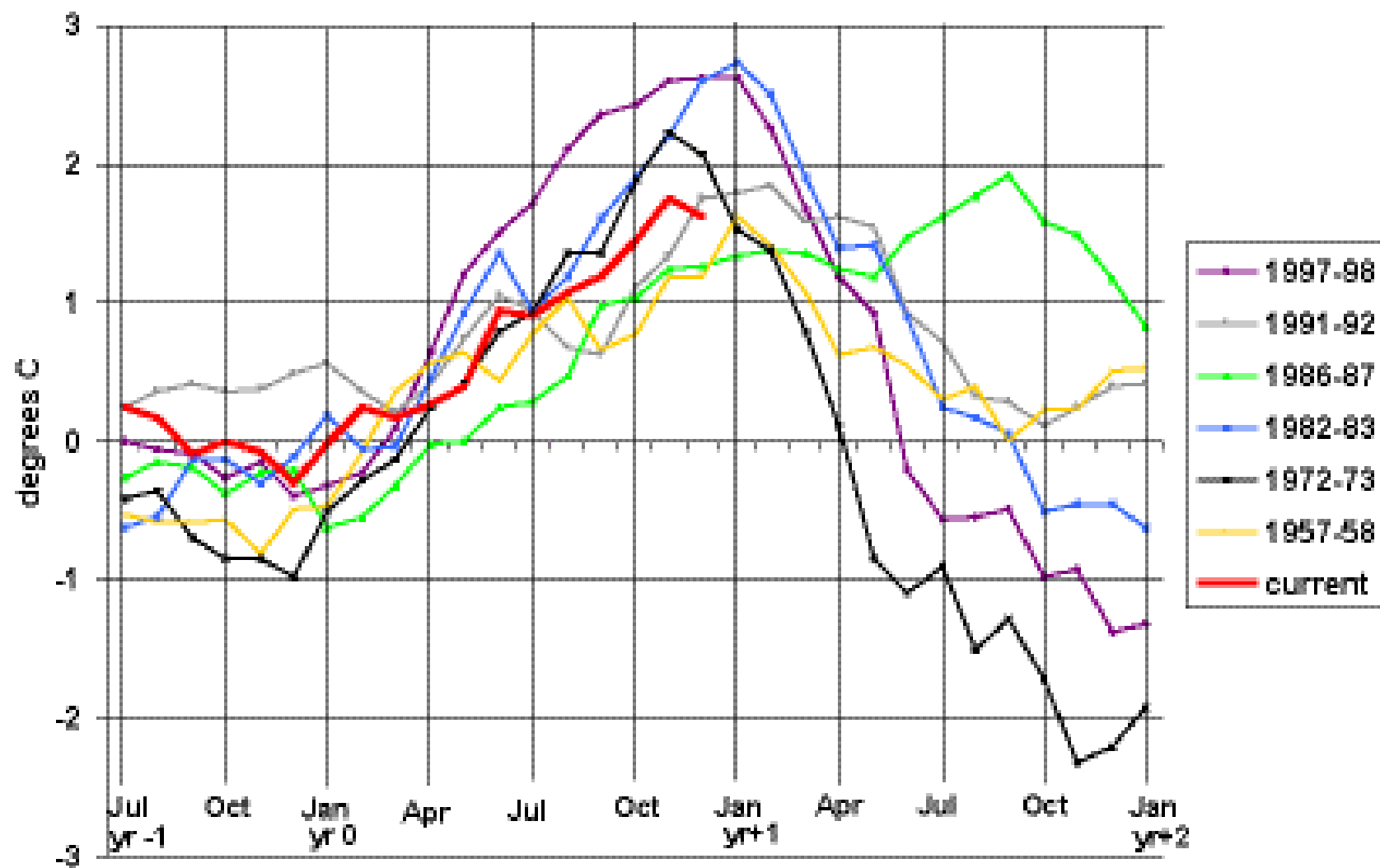
# Dry Western Sahel, 2002 Rainy Season

July-September 2002 Accumulated Precipitation Anomaly (mm, CAMS-OPI)



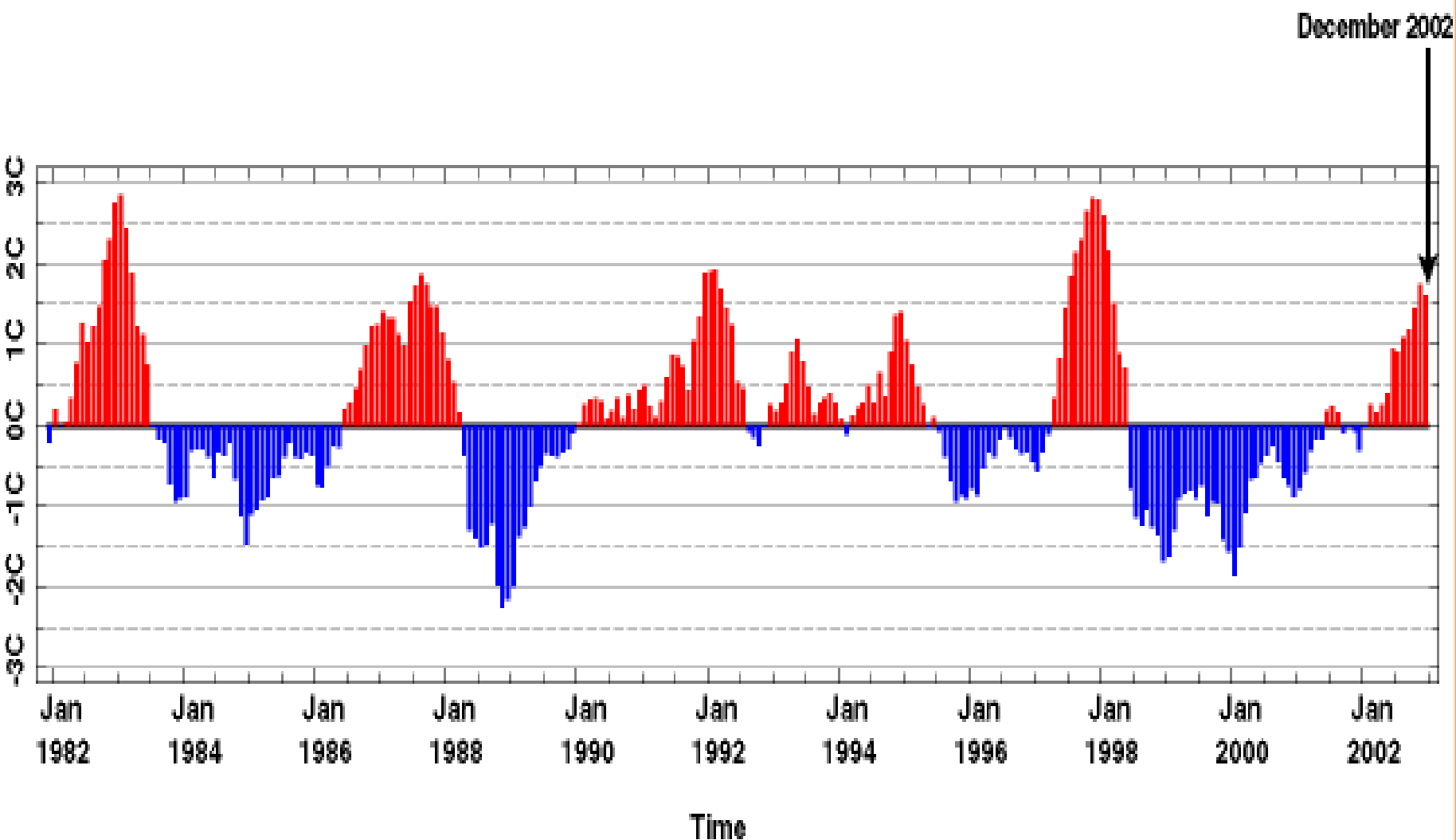
Some stations in Senegal and Mauritania received just 25% to 50% of their normal precipitation

# Current Conditions vs. Past El Niño



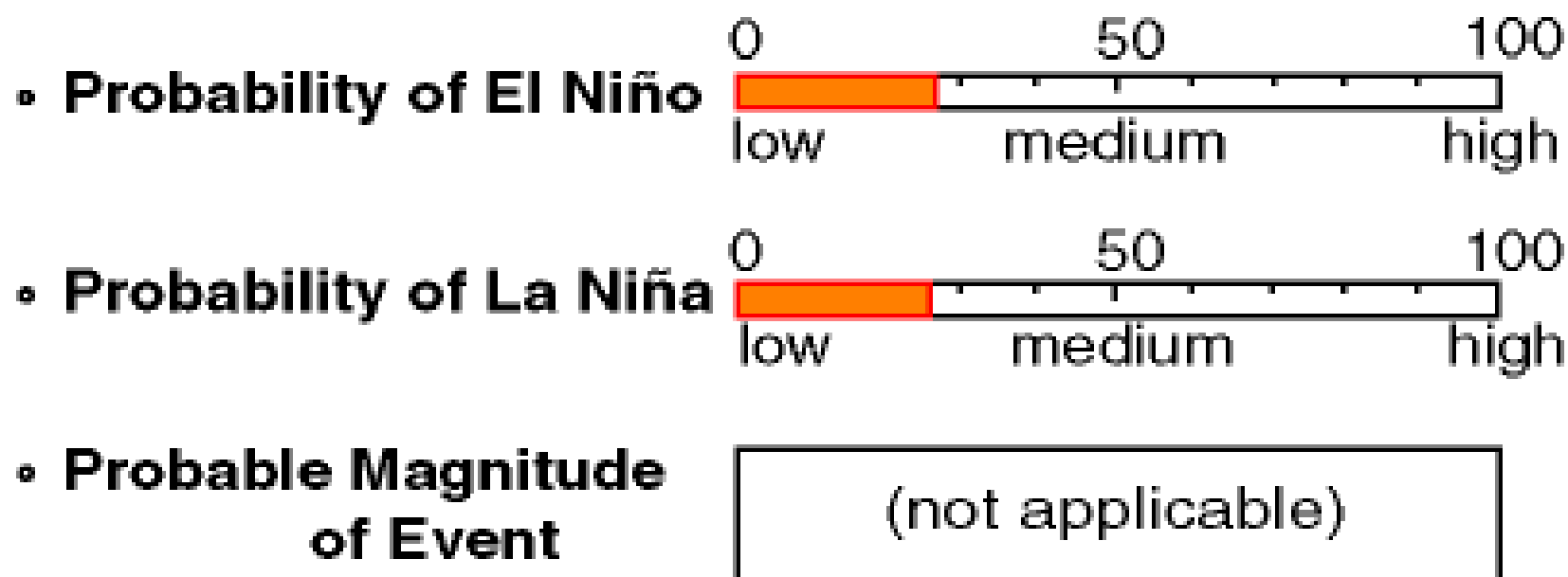


# Historical Sea Surface Temperature Index \*\*



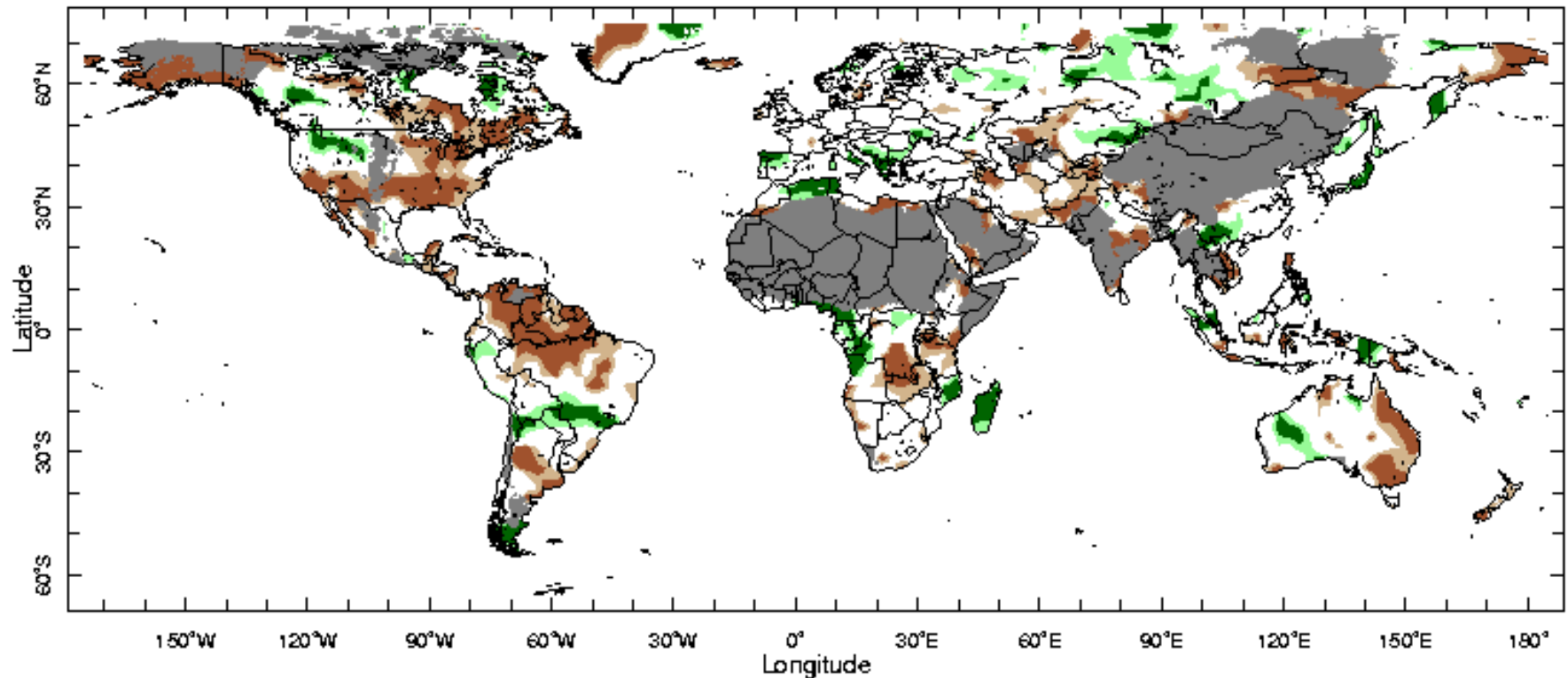
# Current ENSO Forecast Summary \*

**Forecast Period: June 2003 - August 2003**

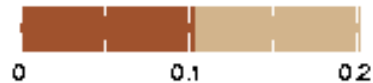


# Precipitation Percentiles

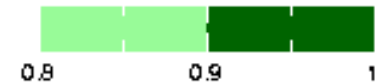
## January 2003



Jan 2003

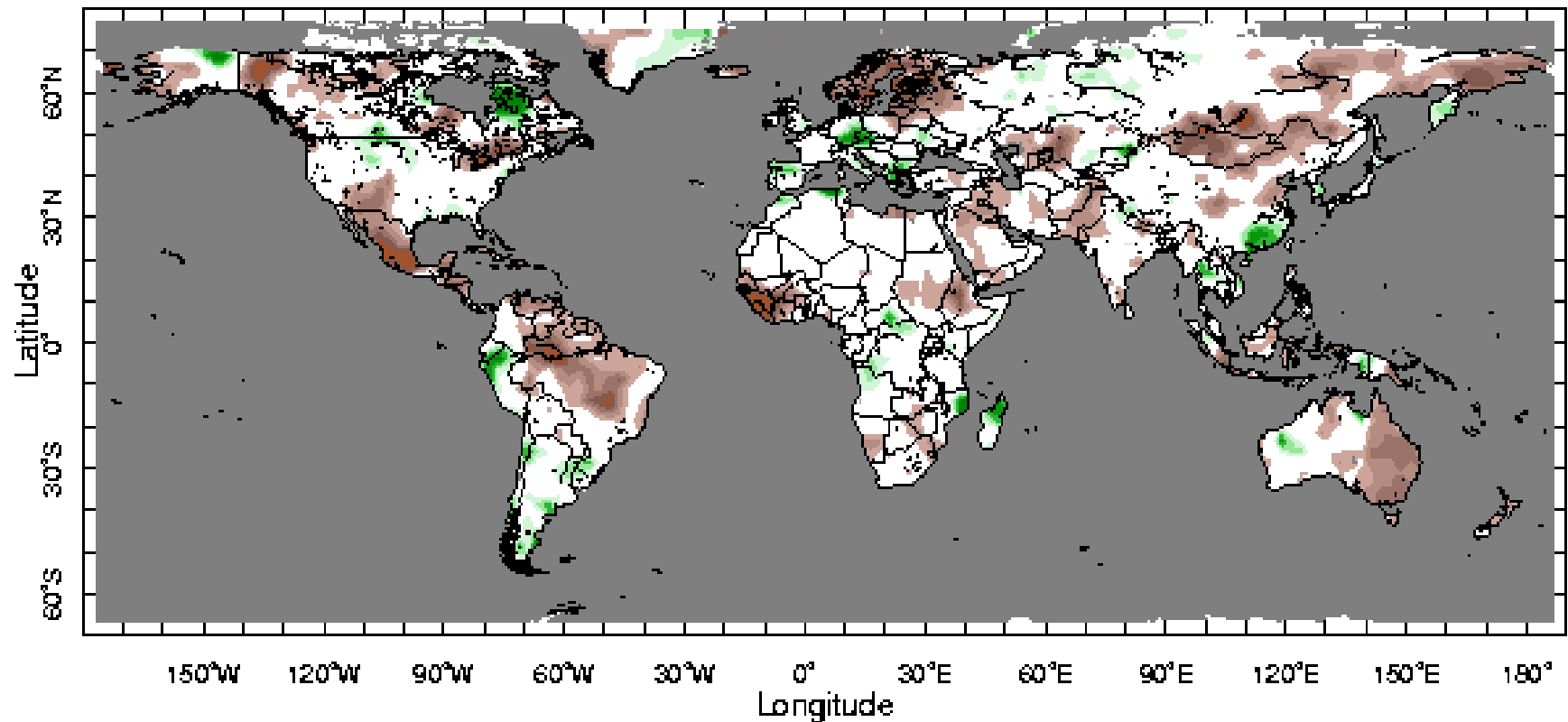


0.3 0.4 0.5 0.6 0.7  
Precipitation Percentiles (brown < 20th and green > 80th)

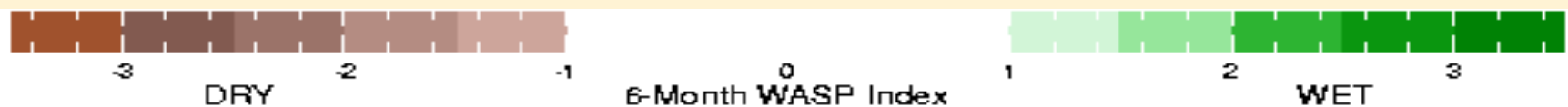


# Weighted Anomaly Standardized Precip (WASP)

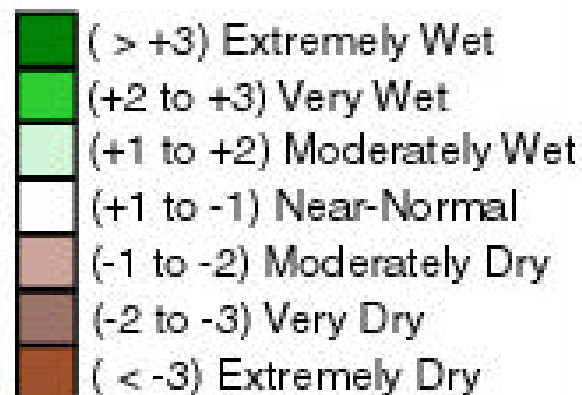
## 6 Months (Aug-Jan)



Aug-Jan 2003

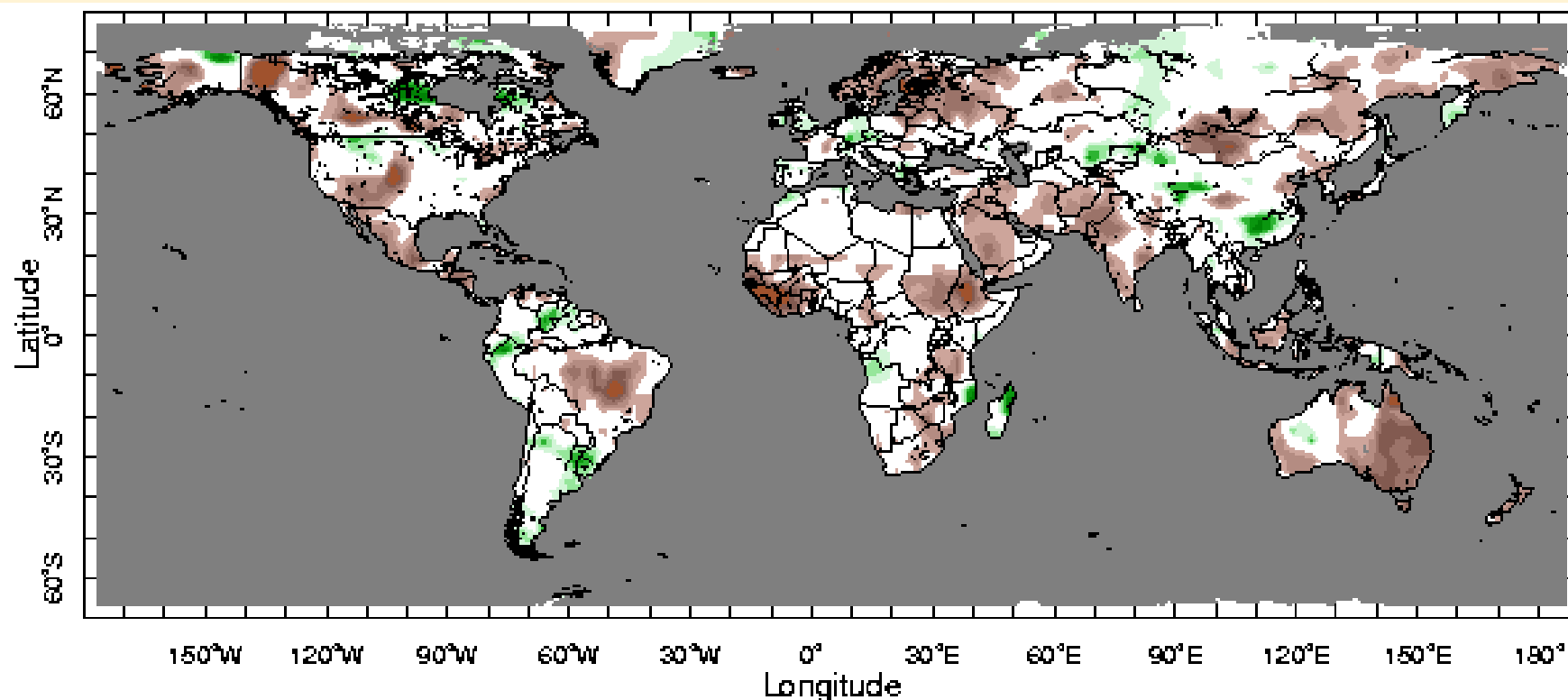


## WASP INDEX LEGEND

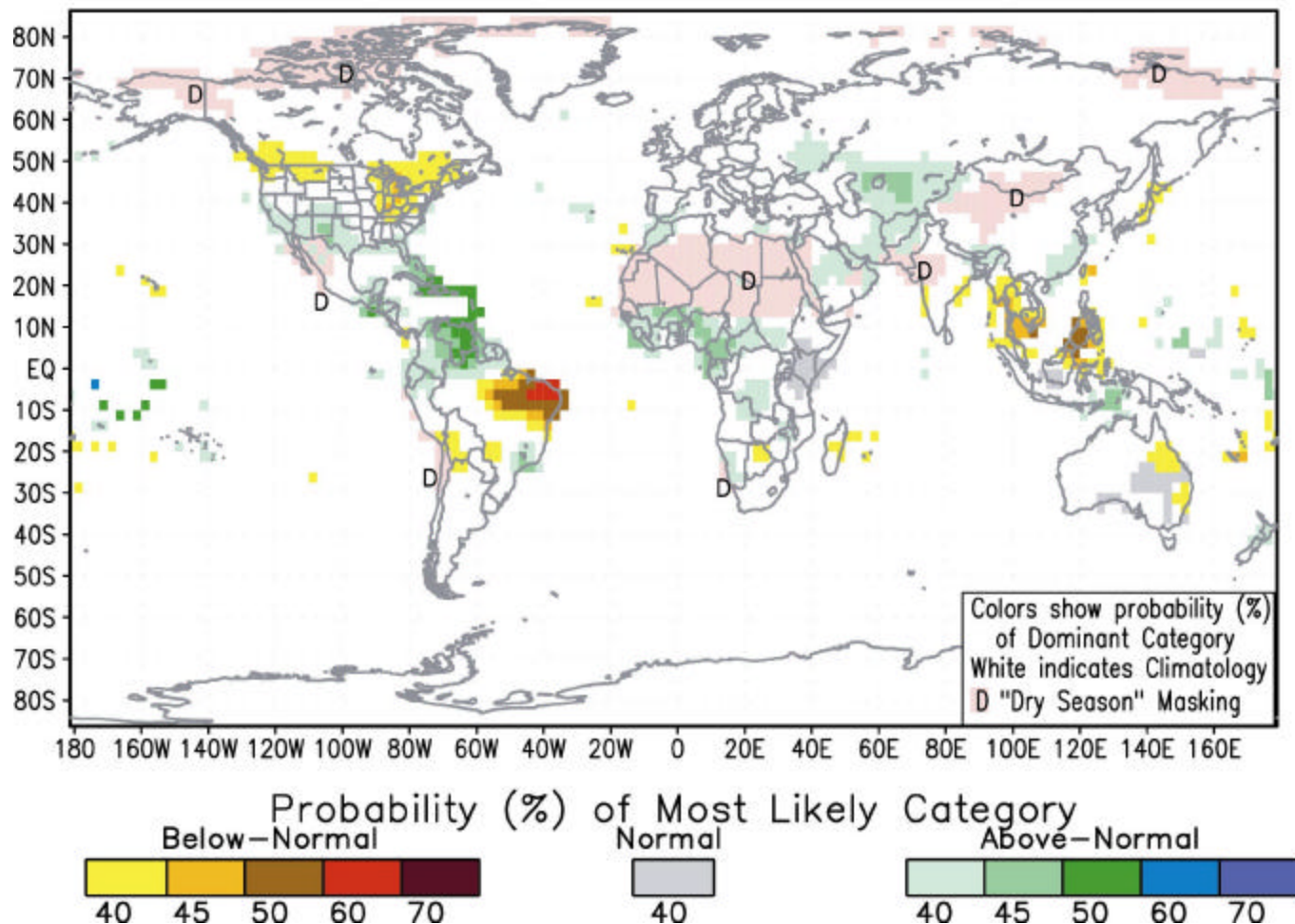


# 12 Month WASP

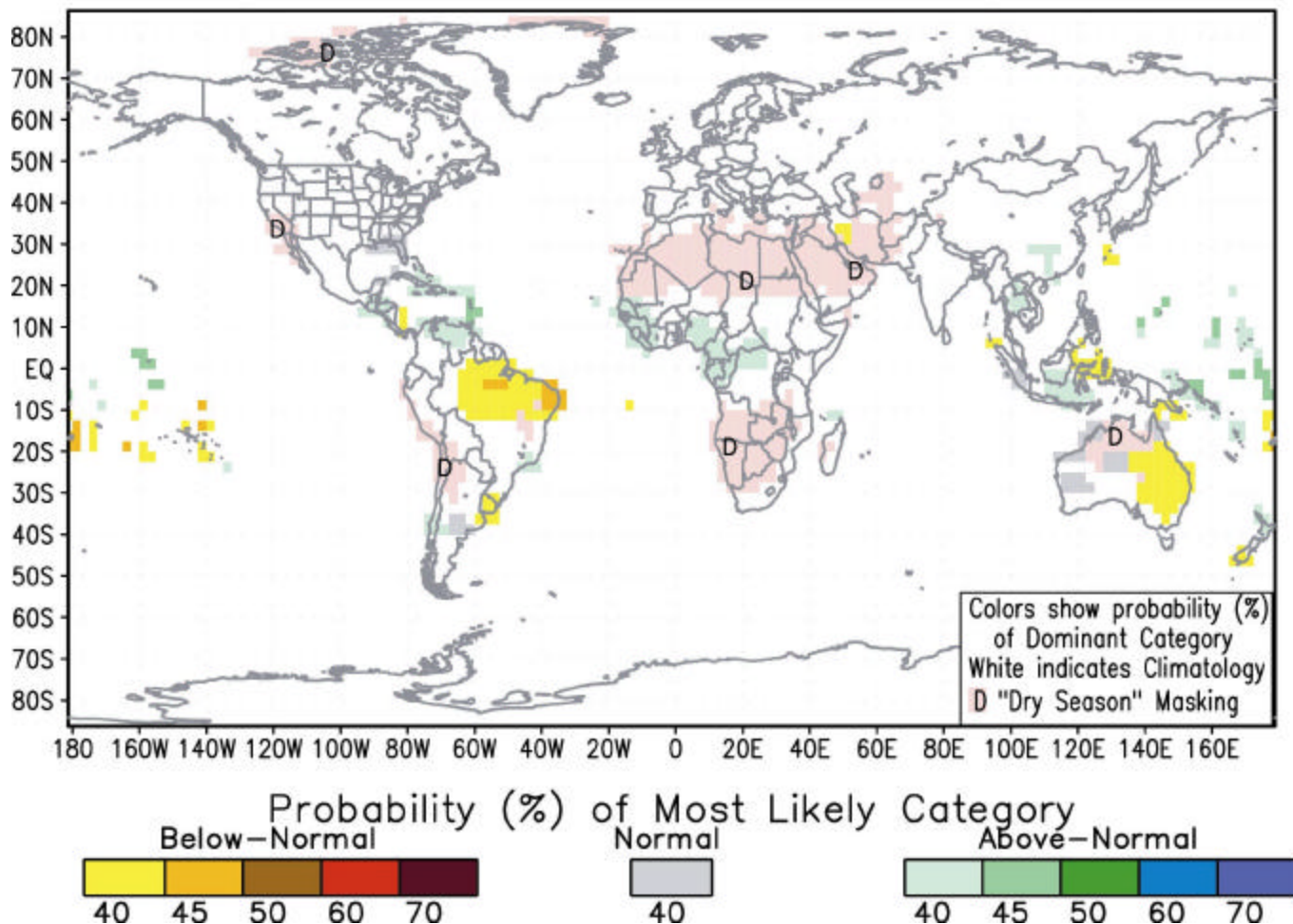
## Feb 2002 to Jan 2003



# IRI Multi-Model Probability Forecast for Precipitation March–April–May 2003 made January 2003



# IRI Multi-Model Probability Forecast for Precipitation May-June-July 2003 made January 2003



# Summary

- No two El Nino Episodes are exactly alike
- Nonetheless, consistent broad patterns of rainfall (and temperature) tend to occur in association with ENSO
- The 2002-2003 El Nino Episode was a moderate event with many of the typical rainfall anomalies
- The 2002-2003 Episode is expected too decrease in strength and be over by late NH spring.







